



# Science News-Letter

*The Weekly Summary of Current Science*

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GENERAL SCIENCE

## Science Proves Hobby For Governors and Bankers

By JAMES STOKLEY

No longer is the typical scientist a stooped graybeard, who wears a long coat and spouts long words in Latin and Greek. As a matter of fact, he never was, but today there is even less justification for the myth than ever before. To people who still cherish the old tradition, however, a visit to a scientific meeting such as that of the American Association for the Advancement of Science, which was held in Philadelphia during the holidays, would be a revelation. Here were gathered nearly 4,000 workers in all fields of science, from archaeology to zymology in the alphabet, from astronomy down to geophysics in the subjects of which they treat. Among this 4,000 were many of the leaders in their fields, but the long beards were in a very small minority. Most of the men were clean shaven, while there were also large numbers of women, who would do credit to any social gathering.

On the whole, so far as one could tell from the appearance of those attending, such a meeting is no different from a convention of business men. And, in fact, this is not surprising, because many of the workers in science nowadays are business men, working in science as a hobby. Of course, Benjamin Franklin set the example for such scientific amateurs, for he was one of the first of them. A printer by trade, a diplomat by profession, Franklin was a scientist by avocation, and to read his autobiography, and to see some of his instruments which are still preserved in Philadelphia, one can hardly tell which side of his nature he was really most interested in. One has the sneaking suspicion, however, that he was chiefly interested in his science.

In England at the same time as Franklin there was another famous scientific amateur, using the word "amateur" in its best sense, a "lover"

of science, not necessarily a novice. This was a clergyman, named Joseph Priestley, who made for himself a permanent place in the history of science by the discovery of oxygen, the element in the atmosphere that makes our very life possible. England has produced many scientific amateurs. Sir William Herschel, one of the greatest astronomers of all time, was originally a music teacher at Bath; and today, the secretary of the Royal Astronomical Society, and one of the leading astronomers of his country, is the Rev. T. E. R. Phillips, the active rector of a parish of the Church of England.

But the United States also has its scientific amateurs. Up in the hills of Vermont, in the town of Springfield, is a factory which makes machine tools. The president of the company gives the business his per-

sonal attention, and a few years ago was honored by his fellow citizens by being elected to serve a term as governor of his State. But James H. Hartness, for that is his name, has another side to his nature, like Benjamin Franklin. If you pay him a visit, he will probably show you around his works, and then take you to his home, on a hill above the town. In back of his house there is a very curious looking structure, which he will delight in explaining to you. At first glance it bears some resemblance to a turret battleship, with a single gun sticking out from it. It is a turret, all right, but not a gun, for it is what Governor Hartness, who invented it, calls a "turret telescope."

With the usual form of telescope in an observatory dome, the inside

(Just turn the page)



HON. JAMES HARTNESS, former governor of Vermont, with the turret telescope which he invented and constructed. A tunnel connects the observatory with his home, a few hundred

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## Amateur Scientists

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of the building must be at the same temperature as the outside, otherwise the warm air from within will rise and go out through the slit in the dome towards which the telescope is pointed. This has the same effect as hot air rising from a stove, and plays havoc with distinctness of what the observer sees. But with the turret telescope, the instrument itself is mostly in the open air, outside the turret, and the image is brought inside by a reflecting prism. The inside of the turret may be kept as warm as desired, as there is no opening for warm air to leave. As anyone knows who has gone through the rigors of a Vermont winter, this is a distinct advantage, and as a further convenience, Governor Hartness has an underground tunnel connecting the observatory with the cellar of his house.

With their chief so interested in astronomy, it is not surprising that many of the men in his works have followed Mr. Hartness' example. Under the guidance of another versatile individual, to whom he refers as the "Leonardo of Springfield," an active group of amateur telescope makers has been established. Their leader, Russell W. Porter, started out as an architect, and the Springfield Public Library stands as evidence of his skill in this profession. But he afterwards went on several arctic expeditions, he is a painter of ability, and during the war he served as an optical expert at the Bureau of Standards in Washington. He also has designed several original forms of telescope mountings, one of which has been adopted in the preliminary plans for a huge telescope of the Mt. Wilson Observatory, which will dwarf all existing instruments. The telescope makers are a group of machinists, pattern-makers, draftsmen and others, who

(Continued on Page 57)

## News-Letter Features

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## ASTRONOMY

# Moon Occults Saturn Next Friday

The first of the interesting astronomical events scheduled for 1927 will take place Friday morning, January 28, when the moon occults Saturn. The earth's satellite, in its wanderings, will pass between the earth and the planet, and, as the moon is not transparent, the planet will be hidden. It is like an eclipse of the sun, with Saturn pinch-hitting for the sun. While this astronomical event has not the great scientific importance that is attached to a solar eclipse, it is rare and interesting enough to be well worth watching. Every astronomer in the area where the occultation will be visible will be watching, provided the weather is clear.

The last time that Saturn vanished behind the lunar disc was over ten years ago on August 25, 1916. Then the phenomenon occurred very early in the morning. On Friday, the occultation will begin at about sunrise, in the eastern states, so that the sky will be too bright for the disappearance to be visible to the unaided eye. With even a small telescope, however, the planet will be visible, and it can be seen gradually to approach the edge of the moon, and then slowly disappear behind it. This is called by astronomers the "immersion." About an hour later, Saturn will reappear on the opposite side of the moon. This reappearance is the "emersion," when the planet will seem to pop out from nowhere. The moon will be past the last quarter, and in the crescent phase, when the moon is moving to a position between the earth and the sun. As the sun is the moon's only source of illumination, the lighted area that we see forms the crescent shape, the inner edge of the crescent being merely the edge of the shadow on the dark side of the moon, the side away from the sun.

The immersion of Saturn takes place at the bright edge of the moon, but the emersion occurs from behind the shaded edge. As this part of the moon is invisible, the planet will seem to appear without warning. Through a telescope the edge of the rings which encircle the planet will first be seen, finally followed by the whole planet.

Though the occultation occurs near sunrise in the eastern states, at a time when people are more apt to be up, it is in the Middle West and Northwest that it will be most spectacular as a naked eye phenomenon.

In this area the sunrise will be late enough and the sky will be dark enough, to permit Saturn to be seen without telescopic aid. Of course, even in the west unaided eye observations will miss the beauty of Saturn's rings since they are only visible through telescopes. The planet will appear merely as a bright star. In the southwestern part of the country the occultation will not be visible at all, and Saturn will merely draw close to the moon and then draw away again.

In one respect, the occultation of Saturn will differ from those of bright stars. Saturn has appreciable area, as we see it, so that as it slowly passes behind the moon, it will gradually diminish in brilliance, and as it reappears, it will gradually brighten. A star, on the other hand, through even the most powerful telescope, appears as a point of light, and therefore vanishes and reappears instantaneously behind the moon. Even the disappearance of a star would be gradual, however, but for the fact that the moon is devoid of an atmosphere.

On the rare occasions when another planet, such as Jupiter, occults a star, the star vanishes somewhat gradually, because there is some sort of a gaseous shell around Jupiter. The same phenomenon makes the sun seem fainter at sunset, because then its light has to pass through a greater layer of the air which surrounds the earth. The lack of a lunar atmosphere, however, does have one effect in the occultation of Saturn; we see the details of the planet sharply right up to the lunar disc.

Science News-Letter, January 22, 1927

## ARCHAEOLOGY

## No Bronze Age in Siberia

Settlements of men of the Old Stone Age found in southwestern Siberia are reported by Waldemar Jochelson, Professor of Ethnology at Leningrad University, now in the United States writing a book on the archaeology of Kamchatka for the Carnegie Institution of Washington. He believes that in Manchuria, Mongolia and Siberia, the late Stone Age passed directly over into the Iron Age without passing through the Bronze Age which intervenes in Western Europe.

Science News-Letter, January 22, 1927

## Times of Saturn's Occultation

City	Begins	Ends	Sun Rises	Place of Reappearance (see note)
Atlanta.....	7:08	8:19	7:36	16 min.
Boston.....	7:24	8:47	7:02	13
Buffalo.....	7:10	8:30	7:34	13
Chicago.....	5:58	7:13	7:05	13
Denver.....	4:49	5:34	7:13	15
New York.....	7:19	8:42	7:11	14
St. Louis.....	5:57	7:06	7:08	14
Seattle.....	3:40	4:15	7:45	15
Wash., D. C.....	7:14	8:36	7:11	14

Note—As Saturn will reappear on the dark side of the moon, you will have to know where to look for its reappearance in order to see it. Imagine that the moon is full and shows a complete circle instead of a crescent, and further that it is covered with a clock face, the figure 12 at the top. A minute hand on the clock, indicating the number of minutes after the hour given in last column, would point to the place where Saturn will emerge from occultation.

Times given are standard for cities listed.

The occultation will not be visible in California, Nevada (excepting the northern part), Arizona, New Mexico (except the northeastern corner), and Texas, south of the Brazos River. In these regions, Saturn will pass close by the moon.

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## MEDICINE

## Disease From Raw Fish

The Chinese preference for eating fish uncooked lays millions in the regions around Canton open to attacks of a serious parasitic disease. The source of the malady, says Dr. Ernest C. Faust, of the Peking Union Medical College, in reporting a recent survey of the parasitic diseases of China to the Archives of Pathology, is a fluke or worm that passes one stage of its existence in fresh-water fishes.

The parasite preys on the cat and dog population of almost every province in China according to Dr. Faust. It gains access to the fish through which it reaches man by means of the common snail wherein it passes one period of its varied career. In man the flukes attack the bile duct and in cases of severe infestation produce grave disturbances of the liver.

Dr. Faust and his co-workers have found that doses of the indicator dye, gentian violet, small enough not to be harmful to the host, act as a fairly effective specific in killing off the parasites. The only really efficacious method, however, for getting rid of the disease he declares, would be to teach some twenty millions of Chinese that fish should not be eaten until it is properly cooked.

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# Science Strives to Conquer Tuberculosis

Tuberculosis is one of the great problems of mankind. These articles summarize the latest and most authentic information about the progress of the warfare against this disease.

## Immunity

Despite the fact that there are half as many deaths from tuberculosis as there were twenty years ago, the white plague still remains one of the world's greatest disease problems. The omnipresent bacillus of tuberculosis spreads with the greatest facility through the whole animal kingdom, yet the disease it produces would be the most curable of maladies if only man could find the secret of his own natural immunity.

Medical science has established that practically everyone in the more densely populated parts of the world at some time in his life becomes infected with tuberculosis, but the proportion that actually die is extremely small. Can this natural immunity that enables the bulk of the population to survive infection be supplemented by some artificial means? To produce an attenuated strain of bacteria that would confer the power to resist disease but whose teeth for producing virulent symptoms are drawn has been a goal sought in many diseases and attained in but few. However, Dr. Albert Calmette, of the Pasteur Institute in Paris believes that he has attained such a preventive for tuberculosis in his vaccine BCG.

BCG is a kind of half-starved strain of tubercle bacilli that have been grown for many years in test tubes on the unappetizing diet of beef bile. Somewhere in the succeeding generations grown in this state of semi-starvation the bacilli have theoretically lost their disease-producing power and yet retain a certain amount of their capacity to call forth antibodies when injected into the body.

After a long series of animal experiments the French scientist and his associates felt that they had sufficient ground for trying out their new vaccine on babies born in homes in the Paris slums where tuberculosis in members of the family made their infection with the disease almost inevitable. Records were kept of the inoculated babies and of others who lived under the same bad conditions but were not inoculated. Twenty-five per cent of the unvaccinated control babies, according to the Calmette data, succumbed to the disease within twelve months where-

as the vaccinated ones were all apparently uninjured by the treatment and failed to contract tuberculosis for a year and sometimes longer.

In spite of these impressive results American authorities feel exceedingly cautious about this new way of acquiring immunity to the white plague. The introduction of living tuberculosis germs, no matter how weakened, into the human system is fraught with danger, they maintain. From long years of experience and observation experts in the U. S. Public Health Service say there is no telling when any given strain of tuberculosis bacilli, even a half-starved one, is likely to break out and become capable of producing virulent symptoms. In cattle inoculations it has been found that different animals react very differently to the same dose of the same type of vaccine.

From such observations it is obvious that there are many factors in this work that are not yet completely known or understood. Consequently there will probably have to be much more study of these conditions before very many authorities feel that artificial immunity can safely replace the imperfect sort that man has somehow evolved for himself naturally.

## Cures

A specific cure for tuberculosis is a thus far unrealized dream of modern medicine. To be a cure for an infectious disease the proposed remedy must meet the requirement of killing the causative germ while it is in the human body without at the same time doing any harm to the surrounding cells of body tissue. Throughout all the ages medical ingenuity has discovered only two sure enough specifics; quinine that runs down the parasites in the blood of malarial patients and the arsenic compounds that are used to annihilate the trypanosomes of African sleeping sickness and the spirochaetes of syphilis.

About three years ago Dr. Holger Mollgaard of Copenhagen believed that he had found such a specific in a complicated gold compound known as Sanocrysin. This product was new in name only, however. The salts of the heavy metals used in medicine like those of gold, mercury and lead, are two-edged weapons, however; while they sometimes cure, they are also poisonous. To offset

the potential ill effects from the use of the gold compound, he injected into his patients serum from calves and horses that had previously been inoculated with dead tubercle bacilli.

In the combined use of this serum with Sanocrysin it was hoped that a new cure for the white plague had been evolved. Unhappily other workers of high standing both in the United States and Europe failed to duplicate Dr. Mollgaard's results either experimentally or clinically. It is possible after still further experimentation that Sanocrysin may be of some use for certain forms of tuberculosis but at present the medical conclusions with respect to its value are punctuated with question marks.

The basis of all fundamental curative work on tuberculosis still continues to be what it has always been since the time of Pliny: rest, sunshine, fresh air and the desire to live. Building up the body so that the blood cells and antibodies will do the rest plus a good strong will, constitute the ground structure on which most T.B. recoveries have been made.

Tuberculosis has been cured in many climates but some scientists maintain that the higher altitudes offer conditions peculiarly favorable. They are of the opinion that the winter sunshine is poor in ultra-violet rays and that the intervening water vapor and solid particles of the air of low altitudes filter out an appreciable part of what there are. Though summer sunlight in the plains probably has as much ultra-violet radiation as it does higher up, the warm humid atmosphere of the lowlands is held to have an enervating effect that offsets the very desirable stimulation that comes from sun treatments. Consequently large numbers of the big tuberculosis sanatoria are located in the mountains.

Dr. A. Rollier, who has been called the world's high priest of heliotherapy, asserts that check ups consisting of over 50,000 X-ray plates of T.B. cases received at his clinic at Leysin, Switzerland, prove that no bone lesion escapes the effect of the beneficent rays. They not only kill off the tubercle bacilli, he says, but the vibrating shock that the solar radiations bring about in the nerve endings in the skin tones up

(Just turn the page)



## Tuberculosis

(Continued from Page 53)

the whole system to better resistance.

Dr. Rollier has been particularly successful with what he calls his work clinics. The careful combination of sun cure and work cure stimulates the patient's morale both psychologically and physically to the point where the natural forces of defense in the body succeed in defeating the bacilli invaders. The fact that earnings from their work help defray the long costly expense of getting well is a vital factor in the cure of the all too large class of patients with limited financial resources.

### Surgery

The resources of science to rescue the sufferer from tuberculosis who is beyond the help of the classical remedies of rest and fresh air have developed to the point where thousands of people today have a new lease on life, who ten or even five years ago would have been given up for lost. Recent adaptations of the branch of surgery known as collapse therapy are among the most helpful advances made in the treatment of lung tuberculosis in the last generation, medical authorities concede.

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## MODERN SCIENCE

AND

## PEOPLE'S HEALTH

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Collapse therapy means just what its name suggests. Air or nitrogen is let into the pleural cavity around the lung which causes the infected organ to collapse so that it can get a chance to rest and heal. Since the lungs are in a state of continuous expansion and contraction, eighteen times a minute, while breathing goes on, the tubercle-formed lesions and ulcers are kept in a state of constant irritation.

Relieved from the strain of perpetual motion the infected lung picks up new energy to combat the hosts of parasites in its midst and in a large proportion of cases where treatment is begun early enough, returns to normal. This method is followed largely in cases where one lung is left intact. A prominent European authority, however, has recently announced that the collapse of both lungs with only twenty per cent. of normal vital capacity left in them has proved beneficial to his patients.

Of the total number of tuberculosis patients in the world the proportion who can get help from artificial pneumothorax, as it is known technically, is very small, yet the processes that are available to the few today are open to the many tomorrow. During a recent visit to this country, Dr. Edouard Rist, a well known French specialist in tuberculosis, declared that pneumothorax has achieved what no other mode of treatment has done before and with increased use better results still will undoubtedly follow in the future.

When the man with a cough reaches the stage where adhesions have formed between the lung and the chest wall and a pain like a knife blade shoots through his diaphragm every time he draws a breath, science has provided another type of treatment. This method involves the use of a kind of lung periscope that has the difficult name of thoracoscope and finds its chief sponsors in tuberculosis work in the Scandinavian countries. It is inserted between the ribs so that the operator can look down into the pleural cavity surrounding the lungs to see where the string-like adhesions occur. Peering through the eyepiece of the instrument the surgeon works through another incision and burns through these adhesions and severs them with a galvanic cautery.

Sometimes there are so many adhesions that whole sections of ribs have to be cut out before a lung can

be induced to collapse. This process is known as thoracoplasty and is resorted to only in very severe cases, but it saves many lives. It is sometimes necessary for the patient to sacrifice several inches of the ribs surrounding the diseased lung for the chance to survive. Even at the cost of continuous ribs, however, life is exceedingly precious and such operations have enabled many a man or woman to resume old occupations who without aid would be tenants of a grassy plot.

### Research

The available facilities for scientific research of America have been marshalled into a concerted attack on tuberculosis. The medical sciences have become so specialized that one mind cannot maintain a grasp on the range over which the tuberculosis problem has spread. In consequence a cooperative study by many experts in different special fields of knowledge has been inaugurated by the National Tuberculosis Association and the U. S. Public Health Service, to run down the omnipresent germ.

On account of its extensive spread among animals and men, tuberculosis presents the gravest disease problem economically in the world. Every effort therefore, is being expended both here and abroad to utilize the best brains and laboratory facilities the world possesses to bring it under control. The committee in charge of the program of research that has been instituted in this country consists of Dr. William Charles White of the U. S. Public Health Service, chairman; Dr. Allen K. Krause, professor of medicine at Johns Hopkins University, and Dr. Paul A. Lewis of the department of animal pathology of the Rockefeller Institute at Princeton, N. J.

The angles of attack on the enemy as outlined by Dr. White are four: First, knowledge of the chemistry of the tubercle bacillus itself; second, information with respect to the chemistry of the cells of the body that take part in the formation of the tubercles; third, study of the anatomy of the different animals subject to tuberculosis; fourth, precise standards in the X-ray pictures of tuberculous lesions.

Dr. Treat B. Johnson of the department of organic chemistry at Yale University has undertaken to determine the chemical composition of the *Bacillus tuberculosis*. Pounds of tuberculosis germs, millions upon millions of them, are used in these

(Continued on Page 55)

## Tuberculosis

(Continued from Page 54)

analyses, but the composition of all living matter is so complex that it probably will be a matter of years before scientists can say with any degree of certainty that the bacillus that causes the white plague is made up of this or that percentage of carbon, oxygen or hydrogen.

Groups of scientists in different universities and research institutions are working on the knotty problems presented by the cells in the body that react with the germ to form tubercles; but the part played by the different kinds of cells in the blood is still far from plain.

Work with different types of animals has brought to light interesting facts about the susceptibility of different organs in the different species. But as yet no satisfactory explanation has been forthcoming that tells why dogs have tuberculosis chiefly in the liver when guinea pigs under the same conditions almost always develop the disease in the spleen.

Perhaps the most fundamental thing that has been accomplished in this organization and cooperation of brains has been the standardizing of the X-ray pictures of tuberculosis. A few years ago when X-ray pictures first began to come into their own in medical practice it was assumed that shadows thrown on the photographic plate from the lungs indicated tuberculosis. Many a diagnosis reached upon such a basis caused untold needless suffering. Families were broken up and precious possessions given up to send the supposedly afflicted one to a sanatorium. There is no longer any need for these unfortunate contingencies to arise. Due largely to the work of Dr. Henry S. Pancoast of the University of Pennsylvania and a charge of the X-ray work in this committee of co-workers, who are in program of research, an X-ray picture of what constitutes a really healthy lung has been achieved as a standard of comparison. After long and painstaking effort a series of X-ray photographs of tuberculous lungs in all stages up to the point of death has been completed so that when the lungs of a T.B. suspect are X-rayed the diagnosticians have something definite with which to compare them.

Science News-Letter, January 22, 1927

Most lakes are the result of glaciation; and consequently lakes are rare in warm dry climates.

## PSYCHOLOGY



CARL EMIL SEASHORE

### Voice Photographer

The psychology of music, and the voice in particular, has been one of the chief researches of Dr. Seashore, for which purpose he has developed special apparatus for photographing sound waves. These studies have given some insight into the exact way in which John McCormack, for example, differs from singers of lesser note.

Born in Sweden on January 28, 1866, Dr. Seashore came to the United States at an early age and took his doctor's degree at Yale in 1895. In 1897 he went to the University of Iowa, where he has been ever since, successively holding the posts of assistant professor of philosophy, professor of psychology, head of the department of psychology and philosophy and finally dean of the Graduate College. During this time he developed at his university one of the strongest psychology departments in the Middle West.

He has received many recognitions of his scientific standing. Among them was his appointment during 1921-1922 as chairman of the division of psychology and anthropology of the National Research Council in Washington.

Science News-Letter, January 22, 1927

Some kinds of turtles like to make their nests in muskrat houses.

Bee flies are so like stinging bees that their enemies are often fooled into letting them alone.

## PHYSICS

### Sunspots Improve Radio

Reception of radio broadcast programs on fairly long waves generally gets worse as spots on the sun increase, but with short waves, of about 34 meters length, it gets better, Greenleaf W. Pickard, Boston radio engineer, told the Institute of Radio Engineers at their New York session.

Mr. Pickard has been studying the relations between activity of the sun, as indicated by the presence of sunspots, magnetic storms on the earth, and radio reception. He began the study in March, 1926, and has continued it to the present, measuring chiefly the reception from station WBBM of Chicago, which operates on a wave length of 226 meters. There is a very close correlation shown between the magnetic character of the days, as determined at the Cheltenham, Md., magnetic observatory of the U. S. Coast and Geodetic Survey, and the radio reception at the time. When the monthly averages are taken, there is no obvious relation between the sunspots and magnetism of radio reception, said Mr. Pickard, but when weekly averages are used "an increase of solar activity is paralleled by an increase in magnetic disturbance and a decrease in reception."

"It is perhaps unlikely that any high correlation between reception and weather elements will be found," he continued. "Solar disturbances and magnetic storms are world-wide events, whereas weather is rather a local matter. Analysis of weather elements over the whole earth indicate that there are areas of positive correlation with sunspots, and also areas of negative correlation. Although I have not yet collected and analyzed reception data from any such collection of receiving points as would fairly represent the earth as a whole, I have found that a bad night for reception in Newton Centre is in general a bad night anywhere in the United States. And I have also found that European reception of distant broadcast stations agrees remarkably well with my measurements of WBBM. I find that, in general, reception is most affected when a spot or group of spots is near the center of the solar disk, that is, when they most nearly face the earth, although there are exceptions."

Science News-Letter, January 22, 1927

Kentucky is the chief source of native asphalt in the United States.

## The Problem of Translation—

☛ Science, probing the unknown universe, writes its findings in cryptic language. A stellar galaxy shining faintly in the heavens hides its splendor and its immensity in numbers and formulæ; a minute germ has thrust upon it a long Latin name. With the aid of such scientific shorthand and such technicalities, science pushes on to new discoveries and new heights.

☛ Yet the facts and the methods of science must penetrate and permeate the whole fabric of civilization if the world is to become an increasingly better place to live in. The man in the street, the child in the school, the merchant in the counting house, the judge on the bench, the priest in the temple, all of those who make the world, must know, appreciate, understand and cherish the spirit of research and the power of thought.

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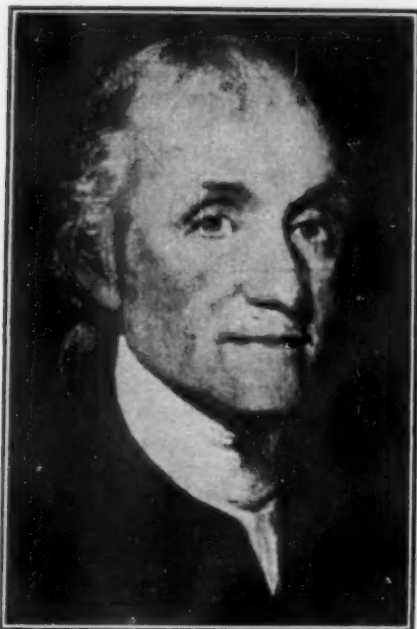
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JOSEPH PRIESTLEY, the 18th century clergyman who distinguished himself by the discovery of oxygen. In the later years of his life, he was forced to leave England for religious reasons, and he settled near Philadelphia.

### Amateur Scientists

(Continued from Page 50)

have erected a sort of astronomical clubhouse on one of the nearby hills, where they frequently spend the night, observing the heavens with reflecting telescopes of their own construction. One of the requirements of membership in the group is that they grind their own mirror, the concave disc of glass that brings the light from a distant star to a focus in a reflecting telescope.

But there is still another group of amateur astronomers, spread throughout the country, who perform scientific work of real value. This is the American Association of Variable Star Observers, which was established under the aegis of the Harvard College Observatory. With the building of the great telescopes in modern observatories, many people think that these instruments are essential to any observations of value. But while these telescopes have made possible the great advances in modern astronomy, there is still a large amount of work that can be done satisfactorily with smaller instruments. To use a great reflector for such a purpose would be about as sensible as to roll bread dough with a steam roller, for there is enough work to be done with the "Big Berthas" which only they can do, to keep them busy all the time.

There is a large class of stars known as "variables" which change in brightness more or less periodic-

ally. Most of these are bright enough to be seen with a small telescope, but to check up on their variations, a large number of observations, made fairly close together, are required. The A. A. V. S. O., as it is called, with its large number of small telescopes, watches these and its members report regularly to the Harvard Observatory. These amateur astronomers are drawn from all walks of life—one very active member, until his recent death, was a Pittsburgh locomotive engineer, who came in from his run about midnight, and then observed until daylight.

Somewhat similar to him is an amateur astronomer in South Africa, Mr. R. Watson, who already has the discovery of several comets to his credit, as well as a "nova," a new star which flashed out from previous obscurity into brightness for a time, then dying out again. Mr. Watson is a telegraph operator, on a night shift, and when he returned to his home early one morning, when other respectable people were sound asleep, he noticed a star in the constellation of Pictor, the "Painter," which he had never noticed before. This was the new star or nova, and its discovery was immediately spread far and wide to astronomers throughout the world. Another amateur discoverer of comets, as well as of "asteroids," or small planets, was the late Rev. Joel H. Metcalf, a Unitarian minister of Winchester, Mass.

But astronomy is by no means the only science that has its amateur devotees. Take the instance of a prominent New York investment banker, who lives in one of the city's suburbs, Tuxedo Park. This man, Alfred L. Loomis by name, has established at his home a private laboratory where he is experimenting himself, and aiding other scientists to experiment, on "long shots"—scientific problems that offer too little immediate return for the average university laboratory to investigate, but that may develop into something of importance.

Already, in cooperation with Prof. Robert W. Wood, of Johns Hopkins University, who is considered one of the world's leading experimental physicists, Mr. Loomis has investigated the super-sound waves that Prof. Wood first observed during the war when he was working at the Toulon Arsenal in France. By passing a powerful oscillating electric current through a crystal of quartz, it is made to vibrate as fast as 200,-

000 times a second. The waves from this are similar to sound waves, except that they vibrate far too fast to be heard. The ear is not sensitive to vibrations faster than about 20,000 a second.

When the crystal is placed in the bottom of a vessel of oil, and its vibrations are passed upward into a glass of water, they produce strange effects. A fish placed in the water is killed almost instantly, microscopic plants are literally disintegrated, and when the curious investigator placed his finger in the water, a sharp pain, which extended to the very marrow of the bone, was experienced. Just what use this powerful new tool will be in science is still uncertain, for only the preliminary steps have been made in its investigation. It is where X-rays were a generation ago.

In an entirely different field of science, that of archaeology, a hard-worked factory executive in Illinois has distinguished himself, George Langford, of Joliet, has taken up Indian mound excavating as many men take up golf. At that, he gets more exercise than most golfers, because what he has to do in his hobby is to work all day, when he has one to spare, with a pick and shovel like an ordinary laborer, with only one volunteer assistant to help him. But already his hobby has developed into a real pursuit of science, with important results, which has already won for him a place in the circles of his chosen science.

His digging has been at the "Fish-  
(Just turn the page)



ALFRED L. LOOMIS, New York Banker, in whose private laboratory at Tuxedo, N. Y., with the aid of Prof. R. W. Wood, of Johns Hopkins University, important researches are being carried out with super-sound waves.

# Biologists!

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### Amateur Scientists

(Continued from Page 57)

er mounds," near Joliet, and is important because he has unearthed three, and perhaps four, layers of remains of Indian civilizations, that existed on the spot at various times in the past. In Old World archaeology several layers of culture above each other are not unusual, but it is rare in America. Another important outcome of Mr. Langford's work is that for the first time a possible clue has been found to the earlier home of the Iroquoian Indian nation, who played an important part in our colonial history. Previously, no remains of the Iroquois have been found west of Ohio, but in the second layer of the Fisher mounds pottery, ornaments and weapons suggestive of the workmanship of this race have come to light after remaining buried for many centuries. And under them are relics representing a still earlier group of Indians, about which little is yet known. Altogether, Mr. Langford has found hundreds of skeletons, as well as enormous quantities of the other relics.

So science is not the dry study of uninteresting facts, nor is it necessarily a solemn pursuit fit only for greybeards. When men, and women, from all walks of life take it up as a hobby, and are able to help advance it, there must be something in it of interest!

Science News-Letter, January 22, 1927

The active career of a modern steel skyscraper is about 27 years.

Prehistoric cave men of the Alpine region depended on the bear for food, clothing, and hunting tools.

Tests of 19 three-year-old children showed that their vocabularies ranged from 48 words up to 1,807.

In the reign of Henry the Eighth in England, 72,000 people were hanged or beheaded for various offenses.

A main ingredient of attar of roses is a chemical substance that can now be made from coal tar, called phenyl-ethyl alcohol.

A fog is a cloud on the earth, and a cloud is a fog in the sky, according to Dr. W. J. Humphreys, of the U. S. Weather Bureau.

Canadian chemists are making tests to determine whether asbestos waste can be used instead of lime in correcting acidity of soil.



## NATURE RAMBLINGS

By FRANK THONE



S

## Spruce

During what the heavier-handed of our humorists sometimes refer to as "the late unpleasantness," spruce figured largely in the day's news. It was the all-necessary wood for airplane construction, and the logging crews of the Northwest were hailed as heroes. Spruce served another war-time purpose even more important than carrying bombs into the enemy's territory; as newsprint paper it formed the wings that carried propaganda much more devastating than TNT.

Now spruce appears in another highly important role. Properly treated with acid and spun out into threads, it is rayon, the fabric that is clothing us all in silken garments such as Solomon in all his glory never knew. "A spruce appearance" is henceforward to be taken much more literally than its unknown originators ever imagined it would be. One reason why the cotton mills of New England and the cotton planters of Old Dixie are having such a hard time is that the rayon weavers of New Jersey and the spruce loggers of Canada are conspiring together to put them out of business. The snowy cotton fields of the South are threatened by the snowy forests of the North.

Spruces are attractive trees, but they seem to prefer most unattractive climates; for their several species—black spruce, Colorado spruce, Norway spruce, and the rest—either cling to the rugged slopes of the loftiest mountain ranges or stretch across the continent in the lonely reaches up toward Hudson's Bay. Beyond the mountains, where the rugged islands of the coast string up along the Panhandle of Alaska, there is one of the lordliest of all spruces, the giant Sitka spruce or tidewater spruce, the only one of its race that grows near salt water. It will supply us with hosiery and reading matter when we have gobbled up the last of its inland kin and are waiting for a new crop to grow.

Science News-Letter, January 22, 1927

## Less Measles This Year?

New York City and some other large cities this winter will be comparatively free from measles, judging by records of recent years. Last winter was a heavy measles year in New York and, from the findings of the Health Department, the city alternates its measles ratio from year to year. A year in which many children catch measles is followed by one in which most children escape the disease.

The reason for this variation is explained by Dr. William H. Park, director of the Bureau of Laboratories of the City's Health Department. During an epidemic year, he says, a moderate number of the city's school children catch measles. They carry it home to their younger brothers and sisters. Those who are old enough to run around spread it to others. The city is ravaged with the disease. The next year these children are immune to measles. Those who lack immunity are mostly babies from six to twelve months old. The number of cases developing falls sharply, and the city escapes a heavy epidemic. But the following winter changing population in a great city brings a new crop of "run-arounds" who have never had measles. In the schools there will be a certain number of pupils from out of town who likewise have never had the disease. Another measles year is due. And so the process repeats itself.

So far this winter, New York City is averaging twelve cases of measles a week. Last winter it averaged more than 200 a week. In 1925, the previous year of immunity, there was only one death from measles in the city during January. Last January there were fifty-nine deaths.

Science News-Letter, January 22, 1927

## PSYCHOLOGY

## Ambitions Not Sure Guide

The interests of a boy or girl who is beginning to think about a career are far from being a sure guide post to the work for which he or she is best suited. This is the conclusion of Dr. Douglas Fryer, psychologist at New York University, who has conducted an investigation to see how well budding ambitions fit together with abilities. Interest may be closely allied with ability in particular cases. But in general a student's interest in a vocation or a course of education is only slightly suggestive of ability in that particular vocation or course of study.

Science News-Letter, January 22, 1927

## 75-Mile Gun Mile Out

A powerful gun, with a range of seventy-five miles, similar to that which bombarded Paris during the war, might shoot as much as a mile away from the place where it is aimed, simply because the earth is turning, according to Prof. William H. Roever of Washington University, St. Louis.

"If we lived on a turning table," said Prof. Roever, "we would observe phenomena which are different from those to which we are accustomed. For instance, a level surface, i. e., the surface of a body of water, would be a paraboloid of revolution instead of a plane.

"Since the earth is a turning body, the phenomena which we observe on it are different from those which would take place if it did not turn. Because of the slow rate of turning the difference between the phenomena for these two states is not noticeable unless a sufficient degree of precision is used in observation. For example, on account of the rotation of the earth, a projectile in the Northern Hemisphere deviates to the right of its initial direction on the horizon. While this deviation is negligible for small velocities, it can be shown that for a gun having a range of seventy-five miles it may amount to nearly one mile.

"On the other hand, the rotation of the earth causes the level surfaces to deviate from the spherical form. The proximity of mountains, or of heavy mineral deposits, produces similar effects in a given locality. Small though this difference is, it is now possible to measure it by means of a very simple, though delicate, apparatus, known as the Eotvos torsion balance, named after its inventor, Baron von Eotvos, a Hungarian physicist.

"By means of the Eotvos torsion balance remarkable work has been accomplished, since by its use not only a very accurate determination of a level surface in a given locality is made possible, but also because it indicates positions of mineral deposits."

Science News-Letter, January 22, 1927

The stegosaurus, one of the great dinosaurs, had a brain weighing less than three ounces.

Spanish topaz, a yellow quartz, is sometimes so like topaz that only gem experts can tell the difference.

# How to Use Key-Word Feature of News-Letter

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## First Glances at New Books

THE AMERICAN INDIANS AND THEIR MUSIC—Frances Densmore—*Woman's Press* (\$2). Miss Densmore explains Indian ways and customs, so that the red men become everyday human beings. About half of the little book is devoted to Indian music, a subject which the author has studied among many tribes, and about which she writes most entertainingly.

Science News-Letter, January 22, 1927

THE MIND OF A GORILLA (Genetic Psychology Monographs)—Robert M. Yerkes—*Clark University* (\$3). Credit for making the first psychological study of a gorilla goes to Dr. Yerkes, who presents in this monograph the results of six weeks of experimenting with a five-year-old child gorilla, named Congo. Dr. Yerkes' report will be welcomed by all who are interested in the minds of apes, primitive human beings, or civilized man of today.

Science News-Letter, January 22, 1927

EDUCATION FOR ADULTS AND OTHER ESSAYS—Frederick Paul Keppel—*Columbia University Press*. Some of the most recent trends in higher education are discussed in the four readable essays which make up this little book.

Science News-Letter, January 22, 1927

THE ANATOMY OF SCIENCE—Gilbert Newton Lewis—*Yale University Press* (\$3). These Silliman Memorial lectures, delivered in the fall, will prove stimulating to the intelligent layman who is anxious to keep in touch with the current trends of the "new physics." And several chapters are on the specialist's "must" reading list.

Science News-Letter, January 22, 1927

CHEMISTRY APPLIED TO HOME AND COMMUNITY—Pauline G. Berry—*Lippincott*. The world explained to second year college students, from cosmetics to ceramics. A new edition of a textbook especially adapted to domestic science courses in chemistry.

Science News-Letter, January 22, 1927

INVESTIGATIONS ON THE THEORY OF THE BROWNIAN MOVEMENT—Albert Einstein—*Dutton* (\$1.75). An early and important, though little known, work by the distinguished author of the theory of relativity. Some knowledge of the principles of thermodynamics is presupposed of the reader.

Science News-Letter, January 22, 1927

## PHYSICS

### A Fable

Quotation from FUNDAMENTAL CONCEPTS OF PHYSICS. By Paul R. Heyl. Baltimore; Williams & Wilkins.

Once upon a time there was a prisoner. His crime must have been great, for he was confined in a cell without windows, where the darkness was relieved only by a faint light that came through a panel of some translucent material in a door in the eastern wall of the cell. The other three walls contained doors also, each different in form from the rest. The door of the south was hot to the touch, and warmed the cell by its radiation. The door of the west contained an always closed wicket with a shelf before it. The prisoner had learned that if (and only if) when he lay down to rest this shelf was duly swept and prepared, would he find upon it when he awoke in the morning his daily material necessities. But the door of the north was most wonderful, for about it a bluish glow played, and from it crackling sparks darted forth to meet the approach of an incautious hand.

How long the prisoner had been in this place he knew not. All his memory was of this cell. He spent much of his time in work, for in the years of his stay he had fashioned a set of rude tools from the debris that littered the floor of his cell. Day after day he would spend at his bench, making keys; for this was his hope—that he might some day make a key to fit one of the locks in the doors of his cell. He would spend weeks over a single key, only to find it useless; then he would throw it upon a pile which already contained many such discarded keys, and set to work patiently upon another.

One night, fatigued, disappointed and discouraged he lay stretched upon the floor of his cell in slumber. And in his sleep he had a dream; for it seemed that there was in his cell an angel who took from his girdle a key of strange and yet simple form, to which all the four locks yielded. And the prisoner saw in his dream that the four doors were bound together without by a great chain, reaching from door to door, and encircling the cell, so that unless all the doors were opened all must remain closed. And as the prisoner tried in his dream to see what lay beyond he awoke, to find the doors closed as he had always known them.

Then the prisoner turned to his bench and began shaping a key after the fashion of that which he had seen in the hand of the angel. He had

(Just turn the page)

## X-Rayed Seeds Help Crops

X-ray treatment of seeds, hitherto regarded as invariably harmful in its effects, is now declared beneficial by Dr. M. Jacobson, a plant physiologist of Camden, N. J., who claims that he has obtained greatly increased yields from seeds subjected to mild doses of "soft" X-rays. The difficulty with the earlier experiments, he states, has been that the rays were used in the harmful "hard" wavelengths, or that the exposure was continued too long.

In one series of experiments which he reports, potted plants grown from rayed seeds grew faster and more vigorously than those grown from unrayed seeds, they flowered and fruited from one to three weeks earlier, and their yield was from 15 to 170 per cent greater, the fruits being always more numerous and often larger individually.

Seeds were not the only things that benefited by X-ray treatment, Dr. Jacobson says. Potatoes raised from treated tubers gave, in three separate field tests, increases in crops of 35, 107 and 170 per cent over plantings of untreated tubers. Further tests showed that light has an unfavorable effect on X-rayed tubers and bulbs, which the experimenter states should be protected from the sun after raying if large increases in yield are to be obtained. Time, however, seems to have little effect in diminishing the effect of the raying, for seeds and potato tubers kept for as much as three months after treatment yielded almost as well as did those planted immediately after exposure to the rays.

Science News-Letter, January 22, 1927

## MEDICINE

### Immune Mice Get Cancer

The theory of hereditary immunity to cancer has received a jolt from experiments conducted by E. Elizabeth Jones of the Cancer Commission of Harvard University. She has produced cancer in mice in which immunity to the dreaded plague has been developed by special breeding. The supposedly immune mice were inoculated with a cancer of the carcinoma type and bits of sterilized flannel were introduced as an irritating agent. Though the number of cases in which the cancer "took" was small it is nevertheless apparent that in the non-susceptible strains of mice as bred in the laboratory immunity to cancer is not absolute.

Science News-Letter, January 22, 1927

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### A Fable

(Continued from Page 61)

had but fleeting glimpse of it, and had caught but the general plan; the details had escaped him. Finally it was finished, and with a trembling hand he tried the key in the eastern door.

The key turned, although with difficulty. At one point he had to put forth all his strength to make it pass one of the wards of the lock; yet it passed, and the bolt yielded. With a shout of joy the prisoner pushed the door outward.

It opened but the merest crack, and a blinding light filled the cell. The prisoner shut his dazzled eyes and felt through the crack with his fingers. His dream was true; there was the chain which prevented it from opening farther. Greatly excited, he withdrew the key and hastened to the door of the south; but here the key would turn but part way, try as he would; so back to his bench went the prisoner, and worked away patiently at the key.

Days of work and trial followed before the key would turn in the south door; yet it finally turned, and the door yielded enough to show the binding chain as with the other.

Then the prisoner looked from the key in his hand to the door of the north, where the blue flame played and the sparks crackled, and he looked round his cell; and he said to himself: "I have never known any abode but this; haply I am not fit for another." Yet he tried the key in the door of the north. Part way it turned, and then would go no farther; so back to his bench again went the prisoner, and filed away patiently at the key.

And lo! as he worked, through the partly opened eastern door there shone upon him a beam of the outer glory; and his heart was glad, and he sang as he shaped the key.

*Science News-Letter, January 22, 1927*

Statistics indicate that heart disease increased during 1926.

The smaller of Mars' two moons is only seven miles in diameter.

A Frenchman has devised an automobile to burn wood instead of gasoline.

Barnacles that infest ships are marine animals belonging to the crab family.

The flint mining industry of Europe is traced back at least as far as the late Stone Age.

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## Anniversaries of Science

**January 26, 1627**—Birth of Robert Boyle, "Father of Chemistry."

Methinks the Chymists in their search after truth are not unlike the navigators of Solomon's Tarshish Fleet, who brought home from their long perilous voyages not only gold and silver and ivory but apes and peacocks too; for so the writings of several (I say not all) of your hermetick philosophers present us, together with diverse substantial and noble experiments, theories which, either like peacocks' feathers, make a great show, but are neither solid nor useful, or else like apes, if they have some appearance of being rational, are blemished with some absurdity or other that, when they are attentively considered, makes them appear ridiculous.

—Boyle: *The Sceptical Chymist*.

**February 1, 1881**—DeLesseps, the builder of the Suez Canal, began the Panama Canal which proved unsuccessful and resulted in the prosecution and punishment of DeLesseps.

It was fortunate for commerce that the chance of nature so nearly cut the earth in two at its middle and that we could finish it with canals. The Suez Canal (opened in 1869) relieved the trade between the West and the East of a long and wearisome journey around Africa or an expensive portage at Suez. Before the canal was opened, thousands of camels transferred burdens between the Mediterranean and Red Sea steamers. The distance and scarcity of coal on the Good Hope Route restricted it at that time almost entirely to sailing vessels. . . . While the American isthmus blocked access to the Pacific, that ocean was in a sense a sort of blind alley as evidenced by the tremendous journey made by vessels that went from London to Yokohama and Puget Sound and then turned to retrace their tracks. Today the short cut home for that vessel is by way of the Panama Canal, thus completing a round-the-world voyage which is to become typical.

—J. Russel Smith: *Commerce and Industry*.

Science News-Letter, January 22, 1927

### METEOROLOGY

## Homes as Weather Bureaus

Every home should be a weather bureau and the householder can tell what the weather will be in his neighborhood even more accurately than from a weather map, Dr. Alexander McAdie, of Harvard University, told the American Meteorological Society in Philadelphia. Cloud motions are not an accurate guide to coming weather conditions either, he said, but it is advantageous to know what the air streams are doing a few thousand feet overhead. For this purpose he has devised a combination cloud and moisture gauge by which it is possible to tell the approximate height of the clouds, as well as their speed of direction, in a few minutes.

Science News-Letter, January 22, 1927

### ANTHROPOLOGY

## Teeth Tell Man's History

Out of the mouths of ancient apes, older than the hills of India where their fossilized bones were found, comes new testimony concerning the ancestry of man. Remains of *Dryopithecus*—the name means simply "tree ape"—from the Siwalik hills at the foot of the Himalayas, are the subject of a report to the American Museum of Natural History, by Dr. William K. Gregory and Dr. Milo Hellman, in which the significance of the formation and shape of the teeth is exhaustively discussed.

According to these investigators the lower molar teeth in this extinct anthropoid exhibit a peculiar arrangement of the points or cusps on the surface of the tooth; three cusps on the outer side, two on the inner side. Between the cusps run an elaborate system of furrows and smaller grooves.

This whole arrangement or pattern is also found in the lower molar teeth of the earliest fossil races of man and in varying degrees even in the more primitive of modern human races. In civilized races this "Dryopithecus pattern" of the molars is usually replaced by a characteristically human or "plus-shaped" pattern.

The main conclusions of the report are as follows:

"To judge from the characters of the dentition the modern anthropoids, taken as a whole, are unquestionably man's nearest relatives among all known mammals; conversely, no other known living or fossil mammals can seriously contest this claim of the anthropoid group.

"We, therefore, prefer to accept this direct evidence and to trace the evolution of the human dentition through that of the primitive anthropoid *Dryopithecus* back to the primitive tarsiid *Parapithecus*, rather than to invent entirely hypothetical and unknown stages leading back to unknown stem forms of pre-primates in the Paleocene or Upper Cretaceous.

"Each existing anthropoid has specialized away from the common ancestor in certain respects.

"When all due allowance for these specializations has been made, the chimpanzee is far less specialized away from the common stem form than is man.

"The various extinct anthropoids known as *Dryopithecus* are decidedly

nearer to the common stem form than are any of the modern giant anthropoids.

"From some form of *Dryopithecus* possibly related to *D. rhenanus* man has inherited his dental formula, the "bicuspid" pattern of the upper and lower premolars, the 'Dryopithecus pattern' of the molars, many details of the incisors and canines and many important characters of the deciduous dentition. It may be noted that this is not a light speculation, but is based on observations of the characters actually inherited in the more primitive human dentitions, apparently from a *Dryopithecus*-like ancestor."

Science News-Letter, January 22, 1927

### HYGIENE

## Maternal Irradiation

If a baby develops rickets in spite of receiving his nourishment in the way traditionally supposed to be best for babies, the anxious parent should not immediately put their young hopeful on a bottle. It can quite possibly be cured by having his mother treated with ultra-violet irradiations.

Although the great advantages of mother's milk are not questioned, Dr. Alfred A. Hess of the Columbia University College of Physicians and Surgeons, has reported to the American Medical Association that from one-third to one-half of the breast-fed babies met with in his experience in this climate have rickets. Working in collaboration with Mildred Weinstock and Elizabeth Sherman, Dr. Hess has conducted experiments that show that the antirachitic substances in human milk are greatly increased by irradiation of nursing mothers with ultraviolet rays. Though direct sunlight has been of great benefit in treating rickets, in this connection it has been found not to give as positive results as the quartz mercury vapor lamp, said Dr. Hess.

These experiments, he continued, suggest that irradiation of the mother while she nurses her baby will not only protect the baby from rickets but will help keep up her own nutritional status. This is especially important because the excessive drain on the calcium and phosphorous content of the body often results in serious impairment of the teeth in young mothers. How effective and practical the method will be, must be determined by further clinical experience, Dr. Hess stated.

Science News-Letter, January 22, 1927

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